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INTERNATIONAL BULLETIN
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1943 No. 9

DISCOVERIES AND CURRENT EVENTS *

SPAIN.

The Colorado Beetle (*Leptinotarsa decemlineata*) during the Year 1942 †

Following a severe initial invasion of winter adults in the spring of 1942, there occurred, in the course of a dry and warm summer, an extensive multiplication of the insect, large swarms of adults and a considerable advance of the scourge.

Besides the zone infested the previous years, in 1942 there were also certain regions of the provinces of León, Salamanca, Avila, Toledo and Madrid ; at the same time there was a greater extension in those of Cuenca and Valladolid.

The general situation was as follows : —

Province	Number of comunes with Colorado beetle foci	Province	Number of communes with Colorado beetle foci
Alava	84	Madrid	14
Avila	6	Navarra	266
Barcelona	179	Palencia	100
Burgos	181	Salamanca	17
Castellón	20	Santander	30
Cuenca	64	Zaragoza	304
Gerona	241	Segovia	96
Guadalajara	155	Soria	343
Guipúzcoa	85	Tarragona	127
Huesca	359	Teruel	123
León	29	Toledo	2
Lérida	186	Valladolid	70
Logroño	184	Vizcaya	79.

During the month of March, sporadic appearances of winter adults were reported in the Province of Zaragoza, but it was during the month of April and particularly in the second half of this month, that the appearance and increase of the insect developed on a large scale in this province.

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* Under this and the next heading the countries are arranged in French alphabetical order.

† Communication from Sr AGUSTÍN ALFARO, Agricultural Engineer, Director of the Phytopathological Station at Zaragoza and Delegate of the Ministry of Agriculture for the Colorado Beetle, transmitted to the Institute by the official correspondent, Sr JOSÉ DEL CAÑIZO, Agricultural Engineer, Bachelor of Natural Sciences, Central Station of Phytopathology, Madrid, Spain.

On May 25 the first larvae having completed their development and ready to burrow into the ground were reported ; in the middle of June adults of the first generation began to make their appearance. At the end of July adult insects of the second generation appeared and during the months of August and September, larval foci were noted, some of which perhaps, of the third generation.

A mild autumn enabled the adult insects to remain on late potatoes until well into October.

ITALY.

Occurrence and First Observations on the Production of the Perfect Stage of *Venturia pirina* and *V. inaequalis* in the Country *

The necessity of ascertaining, also for Italy, the biology of the agents of pear and apple scab (*Venturia pirina* and *V. inaequalis*) led me to undertake a systematic study of the phases of their life history in nature in order to have an exact knowledge of biological data, the direction and basis for an adequate control of these parasites causing damage which increases yearly, seriously menacing fruit trees of considerable economic importance.

Literature on the two fungi is particularly rich in the observations and investigations made chiefly in England, Portugal, Germany and North America.

The question has not been studied so exhaustively in Italy, and it is evident that it would be erroneous to consider adapting to its conditions the results and conclusions obtained in countries differing widely from our own.

Epidemic attacks of both pear and apple scab are becoming ever more frequent and menacing, so that, in importance and extension, this calamity may be compared with the downy mildew of the vine (*Plasmopara viticola*). The factors which regulate the epidemiological conditions are far from being known and, in Italy up to the present, a definitive notification and complete description of the perfect form of the two *Venturia* were wanting.

With a view to contributing towards the knowledge of this important phytopathological problem, I resolved to follow the vicissitudes of the agents of this disease, in the dead leaves fallen, in the autumn, from pear and apple trees affected with scab ; to establish the relation existing between the parasitic phase and the saprophytic phase ; to report the perfect stage ; to study the conditions of its evolution and structure ; to elucidate the most important factors which determine the period and intensity of the epidemic. It is only with complete knowledge of the parasites that we will be in a position to discover the phase of their vulnerability and to have the necessary data for establishing means of control.

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* Communication from Dr Gino Florenzano, Royal Phytopathological Observatory, Plant Pathology Section, attached to the Royal Institute of Plant Pathology, Florence, transmitted by the Royal Station of Plant Pathology, Rome, official correspondent of the International Institute of Agriculture.

The observations of Keitt, Clayton, Langford (1941) and of others previous appear to agree in attributing, at least in the case of *V. inaequalis*, to the perfect stage the dominant function of spreading in the spring, fresh infection to apple trees; as proof of their assertion, they cite the results of experiments conducted over three consecutive years, with fungicides for which the principle of application consists in the direct chemical attack of the pathogenic agent during a vulnerable phase of their life cycle.

In regard to the epidemiological conditions of pear scab, different investigators (Peglion, Prillieux, Arnaud, Catoni) stress the importance that, in the primary infections of the season, the myceliel stromata differentiating in the branches and causing very severe chancrous lesions, would have; these stromata would be capable of furnishing, in spring, an abundant conidial inoculum, which is chiefly responsible for the spread of the disease: the function of the perfect form would, in this case, be but of slight importance and negligible. According to McKay (1938), the main source of primary contamination would, on the contrary, be the mycelium of the conidial stage (*Fusicladium*) wintering between the scales of infected buds and in the adjacent branch, in consequence of the emission in spring of numerous conidia.

With the present state of knowledge, it would seem necessary to distinguish the conditions under which primary infection develops in the pear, from those under which it develops in the apple.

Again: Keitt, Clayton, etc. indicate two phases of especial vulnerability of *V. inaequalis*: after harvesting the fruits, when the leaves may be completely protected by relatively concentrated spraying, and after the fall of the dry leaves to the ground, where energetic action can be taken without harming the trees. Evidently, these investigators confuse vulnerability of the parasite with the possibility of control without taking into account the host plant, and that because the Achilles heel in the life cycle of this parasitic fungus has not been thrown into relief.

For these reasons I resolved to carry out parallel with biological observations control experiments with a view to putting us in a position to establish which may be the most suitable and most adequate methods and which are the effective conditions of vulnerability of specific parasites of scab, also having recourse to the so called destructive treatments, when these conditions take place.

Keeping in view the aims mentioned above I began methodical investigations in November, 1942. The first material for study collected by myself from farms in three localities near Florence, was subjected to careful and painstaking observation, from which after over a month, on December 24, I was able to affirm with certainty to have found perithecia of *V. inaequalis* in the stage called filamentous by Wilson, and characterized by the moment in which the ascogonium begins to disappear and the cavity of the perithecium fills with hyphae up to the appearance of the ascogenous filaments. A few days later, the same discovery was made for the pear. Since then observations have continued without interruption in order not so lose sight of the progressive evolution of the perithecia. The material was

renewed two or three times a month with careful investigations in orchards near Florence. In January-February of the current year, I had also the possibility of examining specimens from Alto Adige, Montagnana (Padua), Fiume, Lugo and Massa-Lombarda (Ravenna), Anagni (Frosinone), and during the month of March from Catanzaro, whence they were kindly sent me by the director of the Agricultural Technical Institute. At regular and always brief intervals, I collected from

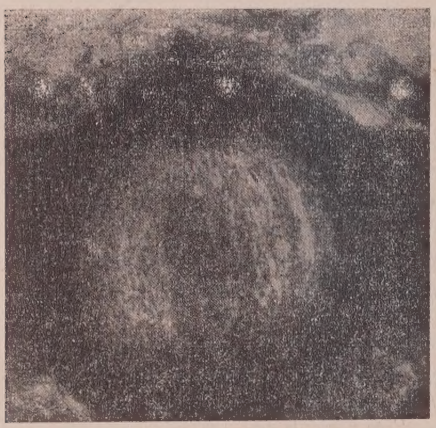

Fig. 1. — Perithecium of *Venturia inaequalis* nearly mature. (Original).

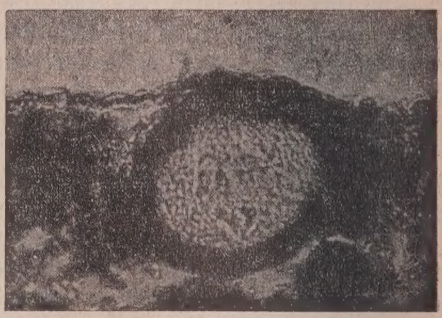

Fig. 2. — Perithecium of *Venturia inaequalis* in which the asci have appeared. (Original).

the ground leaves of pear and apple trees on the farm of the Faculty of Agriculture (Antella) and in the orchard of the horticultural farm of the Agricultural Technical Institute of Florence, farm situated very close to our laboratory. Finally, care had been taken in January to collect a large number of pear and apple leaves in small cloth bags which were placed under clods of turf in order ensure good wintering of the leaves; these leaves were taken from the same source as those on which, it was possible to determine the presence of perithecia in the filamentous stage.

The object of this preliminary communication is to indicate the first results obtained from the investigations which continue both in the laboratory and in the field, reserving myself the right to treat the subject in detail in a publication which will be issued when the biological observations in course will be completed and when the experiments demonstrating facts which appear to emerge from these investigations, will have been effected.

In specimens of pear leaves from Catanzaro which arrived at our laboratory on March 20, 1943 and which I presume were collected on the 15th of the same month, I was able to report the presence of ripe perithecia of *V. pirina* in which at the same time as the asci already differentiated, there was the distinct delimitation of ascospores olive-green in colour, and in some cases of their expulsion.

In specimens of apple leaves of the same date and origin similar observations were made for *V. inaequalis*. During these same days the same indications were reported for specimens of apple and pear trees belonging to the orchard of the Agricultural Technical Institute of Florence, and collected on March 17.

It is now expedient to give a description of the ripe perithecia of the two *Venturia* : —

Fig. 3. — Detail of the inside of a ripe perithecium of *Venturia inaequalis* to show the ripe ascospores. Highly magnified. (Original).

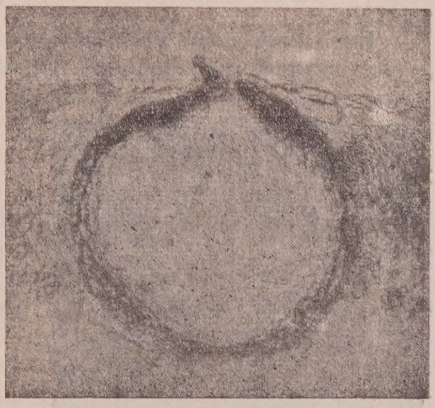

Fig. 4. — Perithecium of *Venturia pirina* with ascogenous hyphae and first appearance of the asci. (Original).

Venturia pirina Aderhold.

When mature, the perithecia have a pyriform or globular aspect with, around the ostiole, bristles varying in number from two to six, or else missing ; the perithecia for the greater part are localized on the lower surface of the leaves within the precinct of especial spots on which they stand out as small black points easily seen with a magnifying-glass, grouped for prevalence along the nervures, or occasionally isolated or more or lesss cattered ; they measure 120-150μ and contain numerous asci 50-60 μ long. The ascospores, olive-green in colour are 13 to 18 μ long with a diameter of 3-6 μ, and are divided by a partition into two unequal parts the lower of which is shorter and also narrower than the other to the extent that the shape as a whole resembles somewhat the imprint of a foot and is rather squat.

Venturia inaequalis (Cooke) Aderhold.

The perithecia appear for the most part to be localized on the upper surface of the leaf in the form of numerous small black points arranged above clearly delimited scabbed over lesions ; they may also occur on the under surface on lesions or spots and rather diffused in type ; all the foliar parenchyma is invaded

by the mycelium as in the case of *V. pirina*. The ripe perithecia may be globular or pyriform, with a very short neck, and dimensions varying around 150-160 μ. The asci, 60-70 μ long, contain, as in the case of *V. pirina*, eight ascospores of an olive-green colour 10-14 × 5-7 μ in size. The shape of these latter differs decidedly from that of the ascospores of *V. pirina*, a partition dividing the spore into two unequal parts of which the upper is appreciably shorter and wider than the lower. Here also the bristles around the ostiole do not constitute a constant characteristic.

This report on the *Venturia* which had never been made before in Italy, may be accompanied by preliminary observations derived in the course of investigation.

Fig. 5. — Ripe perithecium of *Venturia pirina* in which the first ejection of the ascospores is taking place. (Original).

Fig. 6. — Detail of the interior of a ripe perithecium of *Venturia pirina* which shows the ascospores. Highly magnified. (Original).

In general, I noted that the formation of perithecia on the dead leaves of both pear and apple trees is appallingly abundant, and that there is a constant relation between type and abundance of foliar lesions and production of the perithecia. At notable distances from the foliar lesions, it was not possible to reveal the formation of perithecia, except in the pear, in which case on cutting sections of apparently sound leaves, sometimes perithecia of *Venturia* in process of differentiation were seen. It may be added that the diversity of the environment whence came some material examined (Calabria: ripe perithecia of the two species; Florence [Antella farm]: perithecia of the two species not yet ripe; Florence [Orchard of the horticultural farm of the Agricultural Technical Institute]: ripe perithecia of the two species, etc.), indicates the importance and extreme variability with which the climatic factors and trend of the season may influence the biology of parasitic fungi.

At all events, imminent and severe primary infestation of scab is to be expected, because the renewal of the vegetative growth of pear and apple trees is well advanced : the mild winter, contrary to the conclusions drawn in the existing literature, does not appear to have checked or delayed the evolution of the saprophytic phase of these parasites which, if not controlled in due time and in an appropriate manner with the means available under present conditions, will cause this year, as in 1941 and 1942, serious damage to Italian orchards.

SWITZERLAND,

The Colorado Beetle (*Leptinotarsa decemlineata*) in French Switzerland *

Situation on June 1, 1942.

This year the invasion of the Colorado beetle took place from the very be, ginning with exceptional intensity. Some adult insects had already been noted here and there, at the end of April ; these no doubt were insects brought to the surface by spring ploughing and roused by the first mild weather of April. The true emergence of the adults began between May 12 and 15, after a rainy period followed by great heat. On the 14th and 15th, the thermometer rose to 25°C. at Lausanne, 26° at Genève and even 27° at Neuchâtel. Since then, apart from a slight drop in temperature, on the 17th, due to the north wind, and a short period of cold and rain from the 24th to the 26th, the heat kept up until the end of the month, favouring ever more numerous emergences and the spread of the insects. On May 28, a sunny and stormy day, more or less large isolated swarms of adults in potato fields were observed. Egg masses were found from the middle of May and at the end of the month, in different regions the presence of young larvae and in some parts even of older larvae, was reported.

On June 1, the situation in the cantons may be summed up as follows :

Genève. After having appeared towards the middle of the month of May in the communes on both sides of the Rhône, from Vernier to Russin and from Onex to Chancy, the Colorado beetles invaded, in a more or less large number, a large part of the canton. At the end of the month, the beetle was reported in 21 communes. Eggs were found shortly after the appearance of the adults, and at the end of the month larvae were reported to a small extent everywhere, already large in the region of the Bassin de l'Air and Praille.

Vaud. Alfter the report of some isolated insects at Vevey, Yvonand, Valeyres-sous-Rances and the Plaine de l'Orbe already in the first days of May, the general emergence began from May 15. From the 20th it could be said that the Colorado beetle had made its appearance in practically all the regions

* Communication from the Federal Experiment and Seed Testing Station, Lausanne (Mont Calme), Switzerland.

heavily invaded in 1942. The first oviposition was reported on the 15th in the Plaine de l'Orbe, then, from the 20th, young larvae were found in most of the regions ; even some foci of larger larvae were discovered. The number of communes invaded at the end of the month is estimated at over 130.

Neuchâtel. After mid May the Colorado beetles appeared in such numbers in some low-lying regions, that the farmers were alarmed and notices appeared in the papers. At the end of the month 12 communes reported the presence of more or less numerous insects ; chiefly the communes of Cortaillod, Cressier and Landeron were severely infested, those of Fleurier and St. Sulpice in the Val de Travers less. No Colorado beetle had as yet been reported in the higher-lying districts of Val-de-Ruz, Locle and Chaux de Fonds.

Bernese Jura. The perfect insect appeared in the low-lying regions at the beginning of May ; towards the middle of the month it was found in fairly large numbers on advanced potato crops. At the end of the month the first larvae, as yet not very numerous, made their appearance at Crémines and Courgenay. Up to now 14 communes have reported the presence of Colorado beetles, though probably they are also to be found in other communes.

Fribourg. After having started in mass in the regions of the Broye and the Lake, at the end of May the invasion had extended to 26 communes. The most severely infested communes are those of Cugy, Domdidier, Ménières, Montagny-les-Monts and Chiètres. Only the districts of Gruyères and Veveyse have not yet reported any breeding centre.

Valais. The first breeding centre was reported on May 11 at Monthey. At the end of the month as yet only two more communes were reported invaded with 17 foci : 16 foci at Monthey and 1 at Bouveret. At Monthey young larvae were already observed.

In German Switzerland infestation is just as severe. The insect appeared in more or less large numbers in all the cantons with the exception of Graubunden and Ticino.

As is seen and as was to be expected, attack is earlier and more menacing than in previous years. The local officials of the regions which had been heavily infested last year, declare that the invasion this year is much more severe that that of 1942. For the first time in some communes perfect insects were seen devouring potato shoots down to the tuber in the ground, thus checking the growth of the plants. Invasion has spread to all the low-lying regions of the Swiss Highlands ; as yet no Colorado beetle has been reported in the regions of the Jura and the fore-Alps situated above 800 m. altitude.

The Federal Colorado Beetle Commission, assisted by the Federal Agricultural Stations, had already given in March all the necessary instructions for the 1943 campaign. On the other hand, the cantonal commissaries met in April to discuss the special measures to be taken. In these meetings it was confirmed that control operations should remain compulsory and that treatments should be carried out

simultaneously throughout any one region when the larvae had attained a certain size. Cantonal decrees will very shortly give the required instructions insofar as regards these treatments which, in many regions will have to be effected earlier than last years. The stocks of calcium arsenate, rotenone dusts and 'Gésarol' are very considerable and will suffice to ensure the necessary control operations. Scouting by school-children is being organized in several cantons ; it is as well to recall that the assistance of school-children is to be considered as a compulsory civic service in favour of the provisioning of the country.

If everyone does his share, watches his crops and carries out the instructions given, there will be no need for unnecessary alarm. It is with the collaboration of all that good potato crops will be assured.

LEGISLATIVE AND ADMINISTRATIVE MEASURES

Germany (Protectorate of Bohemia and Moravia). — Ministerial Decree No. 91 dated March 3, 1943 comprises the measures against the San José scale (*Aspidiotus perniciosus*) to be observed in regard to the importation and transit of plants and parts of plants. (*Sammlung der Gesetze und Verordnungen des Protektorates Böhmen und Mähren*, Prag, 3. April 1943, Jahrg. 1943, 44. Stück, S. 340-345).

Belgium. — A Ministerial Decree of May 29, 1943 modifies the Ministerial Decree dated May 14, 1937 [see this *Bulletin* 1937, No. 7, p. 153], establishing the charges for the inspection and issue of certificates of the special Phytopathological Service. (*Moniteur belge*, Bruxelles, 27 juin 1943, nº 178, p. 3689).

France. — A Ministerial Decree of April 6, 1943 establishes the modalities for the compulsory control of the Colorado beetle (*Leptinotarsa decemlineata*) throughout France, with the exception of Corsica free from this parasite.

Apart from gardens, potato cultivation is only authorized in fields or plots designated in advance by the agricultural syndic. The locations will be determined in such a way that the crops, in each district, will be grouped in a very small number of centres.

The plan of the fields proposed by the syndic will be forwarded to the director of Agricultural Services who will, if need be, make any modification considered necessary.

On account of the insecticidal treatments to be applied, the cultivation of potatoes in association with other plants used for food by man and animals is prohibited.

To allow of effective supervision of control operations, each field must show a board bearing legibly the name and address of the grower.

All persons growing potatoes are required to search for the eventual presence of the Colorado beetle among his crops.

As soon as any one has ascertained the presence of the Colorado beetle he must advise the associaton ('Groupement') for crop protection, which informs the director of Agricultural Services of the first discovery.

All persons cultivating potatoes must destroy the eggs, larvae, and adults of the Colorado beetle as soon as they appear in the crops, first by careful collecting by hand then by arsenical treatments.

The 'Groupement' for crop protection organizes the campaign in the commune. To this end it forms squads for scouting and collection, which operations should be carried out at least one afternoon a week, beginning from the first report of the insect or, at the latest, from May 15. These squads will be constituted with the participation of all those concerned and school-children.

All potato fields should be throughly looked over at least once a week. The adult insects, eggs and larvae will be collected and carefully destroyed.

This collecting should continue up to July 15 and, in gardens, up to time of harvesting.

All potato fields should be given at least three sprayings of lead arsenate, lime or alumina washes. Late varieties should have four treatments. Severe infestation will necessitate further treatments on the part of the grower.

The dose of arsenate will vary according to the arsenical content of the product selected; it will be a minimum of 1 kg. per hectolitre water for diplumbic arsenic with 11 per cent. arsenic, or 600 grams for calcium arsenate with 25 per cent. arsenic.

Insecticidal dusts, in place of sprays, will only be authorized in cases decided beforehand by the director of Agricultural Services.

In each commune, the syndic, assisted by the chief of the Groupement for crop protection, must make sure that the necessary quantities of insecticides and sprayers indispensable for control operations will be available to farmers in good time and within easy reach.

With a view to the eradication of the Colorado beetle in the Departments of Ardennes, the Meuse, Meurthe-et-Moselle, Vosges and the territory of Belforts scouting must continue in affected fields up to the time of harvesting, and more numerous treatments must be applied in order maintain the leaves constantly covered with arsenate. In addition to collecting the larvae on the plants, search should be made for the nymphs in the soil; the larvae and nymphs will subsequently be carefully destroyed.

Infringements of the above provisions will be punished according to law: imprisonment for one month to a year and a fine of 50 to 500 francs, these penalties being doubled in the case of repetition of the offence.

The Ministerial Decree of January 30, 1942 [see this *Bulletin* 1942, No. 5, pp. 73-75] regulating the control of the Colorado beetle, is revoked. (*Journal officiel de l'Etat français*, Vichy, 4 mai 1943, LXXV^e année, n° 106, p. 1237-1238).

*** Ministerial Decree No. 1542 of May, 28, 1943 modifies Ministerial Decree of March 25, 1941 establishing the statute of the officers of the Plant Protection Service. (*Ibid.*, 20 juin 1943, n° 147, p. 1683).

Italy. — Royal Decree No. 497 of May 3, 1943 establishes the regulations for the application of the Law No. 1360 dated October 9, 1942 [see this *Bulletin* 1943, N° 3, p. 41] containing measures promoting the production of citric acid for the manufacture of fungicides. (*Gazzetta Ufficiale del Regno d'Italia*, Roma, 22 giugno 1943, anno 84°, n. 144, pp. 2170-2171).

Portugal. — Decree No. 32.722 of March 27, 1943 considers as included in the provisions of Article 17 of the Decree of December 23, 1899, organizing the control of the most widespread plant diseases in the country, and for a period of two years, copper oxychloride. (*Diário do Govêrno*, Lisboa, 27 de Março de 1943 I série, núm. 60, pág. 192).

Rumania. — By Decision No. 148.556 of February 12, 1943 the Minister for Industry, Trade and Mines places at the disposition of the Department of National Economy of the Ministry of Agriculture and Domains 400 tons of carbon disulphide for agricultural requirements. (*Monitorul Oficial* (Partea I), Bucureşti, 15 Februarie 1943, anul CXI, nr. 38, pag. 1262).

*** Decision No. 37.178 dated February 20, 1943 of the Minister of Agriculture and Domains establishes the conditions to be observed for the extermination by poisoning of rats, mice, hares, etc. (*Ibid.*, 23 Februarie 1943, nr. 45, pag. 1548).

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